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Effective on 12/08/2004.

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FEE TRANSMITTAL

For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 500.00

Complete if Known

Application Number	10/762721
Filing Date	January 22, 2004
First Named Inventor	Edgar N. Rudisill
Examiner Name	Norca Liz Torres-Velazquez
Art Unit	1771
Attorney Docket No.	SS2910USCNT1

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____☒ Deposit Account Deposit Account Number: **04-1928** Deposit Account Name: **E. I. du Pont de Nemours and Company**

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee
☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**FEE CALCULATION****1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	<input type="checkbox"/> 300	150	<input type="checkbox"/> 500	250	<input type="checkbox"/> 200	100	0.00
Design	<input type="checkbox"/> 200	100	<input type="checkbox"/> 100	50	<input type="checkbox"/> 130	65	0.00
Plant	<input type="checkbox"/> 200	100	<input type="checkbox"/> 300	150	<input type="checkbox"/> 160	80	0.00
Reissue	<input type="checkbox"/> 300	150	<input type="checkbox"/> 500	250	<input type="checkbox"/> 600	300	0.00
Provisional	<input type="checkbox"/> 200	100	<input type="checkbox"/> 0	0	<input type="checkbox"/> 0	0	0.00

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Multiple Dependent Claims	Fee (\$)	Fee Paid (\$)
- 20 or HP = _____	x	50.00	= _____	YES <input type="checkbox"/>	360.00	_____
HP = highest number of total claims paid for, if greater than 20						
Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)			
- 3 or HP = _____	x	200.00	= _____			
HP = highest number of independent claims paid for, if greater than 3						

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
- 100 = _____	/ 50 = _____	(round up to a whole number) x	250.00	= _____

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

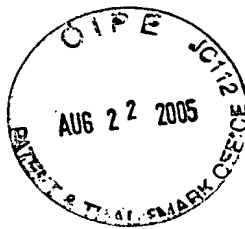
Other: APPEAL BRIEF UNDER 37 CFR 41.37**Fees Paid (\$)**

500.00

SUBMITTED BY

Signature	<i>Thomas W. Steinberg</i>	Registration No. (Attorney/Agent)	37,013	Telephone	(302) 892-0887
Name (Print/Type)	Thomas W. Steinberg	Date	8/18/05		

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



RESPONSE UNDER 37 CFR 41.37
EXPEDITED PROCEDURE
EXAMINING GROUP 1771
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF:

EDGAR N. RUDISILL ET AL.

CASE NO.: SS2910USCNT1

SERIAL NO.: 10/762,721

GROUP ART UNIT: 1771

FILED: JANUARY 22, 2004

EXAMINER: NORCA LIZ TORRES-
VELAZQUEZ

FOR: LOW OR SUB-DENIER NONWOVEN FIBROUS STRUCTURES

APPEAL BRIEF UNDER 37 C.F.R. §41.37

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Final Rejection mailed 15 July 2005 as to the above-referenced application, a Notice of Appeal having been filed concurrently herewith, Appellants submit the following Appeal Brief.

1. REAL PARTY IN INTEREST

The present application is assigned to E.I. du Pont de Nemours and Company, 1007 Market Street, Wilmington, Delaware 19898, said assignment being recorded at reel 8741, frame 0349.

2. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

3. STATUS OF CLAIMS

Claims 76, 79, 81, 83, 86, 87, 89, 91, and 93–96 stand finally rejected in the present application.

4. STATUS OF AMENDMENTS

All amendments have been entered.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER

In one embodiment, the present invention is directed to a thermally bonded nonwoven fabric comprising multiple nonwoven layers which are made of hard yarn meltspun polyolefin fibers and which are constituted of the same, single polymer, and at least one nonwoven layer of fibers comprising polyolefin without a fluorocarbon additive having cross-sectional areas of less than about $75 \mu\text{m}^2$, and wherein at least one hard yarn meltspun nonwoven layer has a repellent fluorocarbon finish, said fabric having a basis weight between about 13-125 g/m^2 , a grab tensile strength in both the machine- and cross-directions at least about $1 \text{ N}/(\text{g/m}^2)$, normalized for basis weight, and a combination of Frazier permeability at least about 10 and up to about $30 \text{ m}^3/\text{min-m}^2$ and hydrostatic head between about 75 and 99 cm. (Claim 76).

In another embodiment, the present invention is directed to a thermally bonded nonwoven fabric comprising multiple nonwoven layers which are made of hard yarn meltspun polyolefin fibers and which are constituted of the same, single polymer, and at least one nonwoven layer of fibers comprising polyolefin without a fluorocarbon additive having cross-sectional areas of less than about $75 \mu\text{m}^2$, and wherein at least one hard yarn meltspun nonwoven layer has a repellent fluorocarbon finish, said fabric having a basis weight between about 13-125 g/m^2 , a grab tensile strength in both the machine- and cross-directions at least about $1 \text{ N}/(\text{g/m}^2)$, normalized for basis weight, and a combination of Frazier permeability at least about 15 and up to about $30 \text{ m}^3/\text{min-m}^2$ and hydrostatic head between about 75 and 99 cm. (Claim 79).

Other embodiments of the present invention are directed to garments made from these fabrics. (Claims 83 and 86).

**6. GROUNDS OF REJECTION TO BE
REVIEWED ON APPEAL**

1. Claims 76, 79, 81, 83, 86, 87, 91, and 93-96 stand rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement.
2. Claims 81 and 87 stand rejected under 35 U.S.C. §§112, first paragraph as failing to comply with the enablement requirement.
3. Claims 76, 79, 81, 83, 86, 87, 91, and 93-96 stand rejected under 35 U.S.C. §103(a) as obvious over Perkins et al. (U.S. Patent No. 5,178,932) in view of Potts et al. (U.S. Patent No. 5,145,727).
4. Claims 76, 79, 81, 83, 86, 87, 91, and 93-96 stand rejected under 35 U.S.C. §103(a) as obvious over Ofosu et al. (U.S. Patent No. 6,268,302) in view of McAmish et al. (U.S. Patent No. 4,908,163).

7. ARGUMENT

It is noted that this application had been accorded “special status” by the Office in response to Appellants’ petition due to the fact that there is an infringing product on the market.

Rejection under 35 U.S.C. §112, first paragraph (New Matter)

Claims 76, 79, 81, 83, 86, 87, 91, and 93-96 stand rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement, as the Examiner deems the latest amendment to claims 76, 79, 83 and 86 to contain “new matter”.

The amendment at issue was filed 18 May 2005, and inserted the following negative limitation into the claims to further describe the fibers having cross-sectional areas of less than about 75 μm^2 : “comprising polyolefin without a fluorocarbon additive”.

At page 6 of the Final Office Action, the Examiner asserts that

The negative limitation included in the present claims is considered new matter herein as there is no concept of exclusion of a fluorocarbon additive from the polyolefin forming the fibers taught by the specification. (Emphasis in original).

Appellants respectfully submit that the amendment to the claims does not represent new matter and is perfectly permissible under the patent law. In this regard, the Board's attention is directed to the MPEP at section 2173.05 (i), wherein it is stated:

[A] lack of literal basis in the specification for a negative limitation may not be sufficient to establish a *prima facie* case for lack of descriptive support. *Ex parte Parks*, 30 USPQ2d 1234, 1236 (Bd. Pat. App. & Inter. 1993).

In the present case, Appellants respectfully submit that the Examiner's determination that the amendment submitted herewith lacks basis is insufficient to establish a *prima facie* case for lack of descriptive support. The MPEP further states:

Any negative limitation or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977)... (Emphasis added).

The original disclosure (including the claims) clearly teaches two different alternatives for imparting liquid repellency to the fabric. One alternative is applying a repellent finish to the fibers. This is described in examples 1-37 in the spec. and in original claims 58 and 59. The other alternative is blending an additive into the fiber itself. This is described with respect to the sheath core embodiment on page 16 of the specification and generally in original claims 49-51. Claim 51 clearly establishes specific description of an embodiment wherein liquid repellency is provided to the fiber by blending a fluorocarbon additive into the fiber. As such, according to the Johnson court, Appellants may exclude that specific limitation from the claims. It is

further noted that the currently rejected claims require at least one fiber layer have a repellent fluorocarbon finish.

At page 3 of the Final Office Action, the Examiner argues that the concept of the exclusion of fluorocarbon additives in the polymer fibers is not supported in the present specification by directing attention to Examples 1-37 of the application (page 10), wherein Appellants disclose the application of a repellent finish on PET fibers of those examples. Appellants submit that the Examiner appears to have missed the distinction between incorporating an “additive” into the polymer of the fiber (original claims 49-51), in which process the additive is added to the polymer prior to spinning the fibers, and finishing the fabric with a repellent finish composition (original claims 58 and 59), wherein the already-formed fibers/webs are coated with a finishing material. In the case of Examples 1-37, Appellants used an after-applied finish solution to impart repellency to the fabrics, rather than incorporating a fluorocarbon additive into the polymeric fibers themselves. This is contrary to the Examiner's contention that there is no concept of exclusion of fluorocarbon additives within the fiber polymer itself. Clearly, if one was to provide a fluorocarbon finish to the fiber, one of ordinary skill in the art would expect that a fluorocarbon additive was not already blended into the fiber, since repellency is provided by the finish. Thus, the cited examples provide clear support that Appellants were in possession of the concept of excluding a fluorocarbon additive, blended into the polymer.

As such, according to MPEP 2173.05 (i) and In re Johnson, these alternatives may be excluded without adding “new matter”, as both inclusion and exclusion of the same are fully described. Withdrawal of the rejection is requested.

Rejection under 35 U.S.C. §112, first paragraph (Enablement)

Claims 81 and 87 stand rejected under 35 U.S.C. §§112, first paragraph as failing to comply with the enablement requirement. The Examiner disagrees with Appellants' position that the inclusion of a meltblown fiber layer in the present invention is fully within the scope of enablement of the specification (Final Office Action, pages 3 (b) and 6).

Appellants submit that the incorporation of a meltblown fiber layer into nonwoven fabrics to increase hydrostatic head barrier properties is so well-known in

the art that a specific recitation of such an embodiment is unnecessary in the application.

“A patent need not disclose what is well known in the art.” In re Wands, 858 F.2d 731, 735, 8 USPQ2d 1400, 1402 (Fed. Cir. 1988).

In this regard, the Board’s attention is directed to the fact that Appellants describe SMS (spunbond/meltblown/spunbond) fabrics as conventional in the art (page 2, lines 1-17). Likewise, a plethora of references of record herein, including those cited by the Examiner, disclose incorporating a meltblown fiber layer into composite nonwoven fabrics.

The Examiner argues that the present disclosure “teaches away” from the inclusion of a meltblown layer (Final Office Action, bottom of page 3). The fact that Appellants teach that in most cases reinforcement with a meltblown layer is not required, certainly does not mean that one of ordinary skill in the art would not know how to make and use a fabric that did contain a meltblown layer. Obviously, if meltblown layers were well-known in the art then one skilled in the art would, without undue experimentation, know how to incorporate meltblown layers into the fabric.

Appellants are not limited to only preferred embodiments, thus the Examiner’s contention that the present disclosure teaches away from the inclusion of a meltblown layer is both mischaracterized and irrelevant. Even if the disclosure did teach away from the inclusion, if one of ordinary skill in the art would recognize how to incorporate the meltblown layers into the fiber, then the claims are enabled. This is the case as evidenced by the well-known nature of meltblown layers as admitted by the Examiner.

Accordingly, Appellants submit that the inclusion of a meltblown fiber layer in the present invention is fully described within the specification-as-filed, especially in view of the prior art known as of the effective filing date of the present application, and as such claims 81 and 87 are fully enabled. Withdrawal of the rejection is requested.

Rejection under 35 U.S.C. § 103(a) over Perkins et al.
in view of Potts et al.

Claims 76, 79, 81, 83, 86, 87, 91, and 93-96 stand rejected under 35 U.S.C. §103(a) as obvious over Perkins et al. (U.S. Patent No. 5,178,932) in view of Potts et al.

Appellants essentially agree with the Examiner's characterization of the teachings of Perkins et al. as set forth at item 4 of the Office Action issued 8 April 2005 (pp. 4-6). However, Perkins et al. disclose SMS fabrics that invariably contain a fluorocarbon additive in the meltblown layer thereof.

The microfibers of the second nonwoven web are prepared from a mixture of an additive and a second thermoplastic polymer, which additive imparts alcohol repellency to the surfaces of the microfibers. (Abstract)...

Alcohol-repellent additives typically are fluorine-containing materials. Examples of fluorine containing materials are the following: (col. 7, lines 55-57).

Perkins et al. then disclose a number of suitable, fluorine-containing additives "A" through "M" at column 7, line 59, bridging to col. 8, line 68, all of which are fluorocarbons. No other "alcohol-repellent" additives are disclosed or suggested by Perkins et al. and accordingly, Perkins et al. is not enabling for any other "alcohol-repellent" additives besides fluorocarbon additives.

According to the present claims, the polyolefin used to spin the fibers having cross-sectional areas of less than about $75 \mu\text{m}^2$ does not contain a fluorocarbon additive. Perkins et al. provide no motivation to exclude fluorocarbon additives from their meltblown layers and as such cannot be said to have made obvious the present claims; and since the addition of fluorocarbon additives to the polymers of Perkins et al.'s meltblown fibers is central to their invention, to exclude those additives would destroy the desired function of the Perkins et al. invention. As such, the skilled artisan would not have been motivated to so modify Perkins et al.

In an effort to supplement the disclosure of Perkins et al., Examiner directs attention to Potts et al., specifically to Combination 3-9 (col. 17, lines 37-43), which discloses a three-layered SMS fabric in which the spunbond layers (31 and 34) contain an alcohol-repellent additive (in contrast to the finish applied to at least one of the presently claimed hard yarn, meltspun, nonwoven layers), and the meltblown

layer (32) is not disclosed to contain an additive. The Examiner argues that it would have been obvious to modify the structure of Perkins et al. to provide it with a middle meltblown layer without a fluorocarbon additive “with the motivation of providing suitable constructions for medical fabrics as disclosed by Potts et al.” (Final Office Action, page 10). The Examiner notes that Potts et al. is the parent application of Perkins et al. (Final Office Action, page 9, penultimate line).

Interestingly, Perkins et al. refer to the inventions of Potts et al., wherein the patentees state:

The multilayered structures described in such parent application [Potts et al.] possess various distinct advantages over earlier structures. It subsequently was unexpectedly discovered, however, that not all combinations of fiber surface characteristics performed equally well. This was particularly true for three-layer nonwoven composite structures where the center layer contained an additive which imparted alcohol repellency to the fibers thereof and both alcohol repellency and electrostatic charge dissipation were desired for the composite structure. (Col. 1, lines 24-34; emphasis added).

As set forth above, Perkins et al. is directed to composite nonwoven fabrics which invariably have a fluorocarbon additive within the polymer of the meltblown fibers, and thus it would appear that Perkins et al., especially in view of the quotation above, deems this formulation to represent an advance in the art over their parent application, Potts et al.

As argued above, to modify Perkins et al. in the manner suggested by the Examiner so as to exclude such fluorocarbon additives from the meltblown layer would destroy the stated improvement of the Perkins et al. invention. Further, the quotation from Perkins et al. above represents an express teaching away from the very modification proposed by the Examiner, i.e. to exclude fluorocarbon additives from the melt blown layer according to the teachings of Potts et al.

As such, the skilled artisan would not have been motivated to so modify Perkins et al., even in view of Potts et al.

Withdrawal of the rejections over Perkins et al. in view of Potts et al. is respectfully requested.

Rejection under 35 U.S.C. §103(a) over Ofosu et al.
in view of McAmish et al.

Claims 76, 79, 81, 83, 86, 87, 91, and 93-96 stand rejected under 35 U.S.C. §103(a) as obvious over Ofosu et al. (U.S. Patent No. 6,268,302) in view of McAmish et al. (U.S. Patent No. 4,908,163). Appellants traverse this basis of rejection and respectfully request reconsideration and withdrawal thereof.

Appellants reiterate their comments in traverse of the rejection over Ofosu et al. in view of McAmish, as set forth in their previous responses, and in their initial comments in the Request for Continued Examination, filed March 30, 2005. To summarize, Appellants pointed out that Ofosu et al. disclose a multilayer laminate of fiber webs made from two different polyolefin polymers that have different melt flow rates (MFR), one having an MFR below 50g/10 min and the other having an MFR above 50g/10 min (col. 1, lines 40-47). In order to differentiate the MFRs of the polymers, Ofosu et al. disclose adding up to 1000 ppm of peroxide and up to 5 wt% of a catalyst to a low MFR polyolefin, so as increase “the melt flow rate of the polymer by a factor of at least two” (col. 1, lines 53-58).

In contrast thereto, the presently claimed invention expressly requires multiple fiber layers made of the same, single polymer, such as disclosed in Examples 41 and 42 of the present application, wherein identical plies of polypropylene fabrics of Examples 38-40 are combined (pages 14-15).

McAmish was merely cited for the proposition that it is known in the art to apply a fluorochemical coating to a nonwoven fabric, but McAmish in no way compensates for the failure of Ofosu et al. to disclose or suggest the use of multiple fiber layers made of the same, single polymer. Thus, the combination of Ofosu et al. and McAmish fails to make out a proper, *prima facie* case of obviousness.

In response to Appellants' arguments, the Examiner asserts that, in spite of the fact that Ofosu et al. clearly disclose the use of polypropylenes having differing melt flow rates, the polypropylene polymers of Ofosu et al. are “the same, single polymer” and as such are within the scope of the present claims. In support of her arguments, the Examiner states:

[T]he polypropylene polymers used by the Ofosu reference do read on the term “same, single polymer” in the context described by Appellants' Specification in which the polymer would be readily recycled back to

constituent monomer... The fact that Ofosu et al. uses polypropylene with different melt-flow rate[s] in the different layers does not make the material different from the "same, single polymer" as defined in the present invention since the constituent monomer of polypropylene is propylene regardless of the melt-flow rate of the polymer. (Office Action, page 3).

Appellants traverse the Examiner's findings for several reasons. While Appellants express a preference for use of the same, single polymer such that the medical fabrics formed therefrom can be recycled into constituent monomer, as cited by the Examiner, Appellants respectfully submit that those skilled in the recycling art (which the present inventors are not) would know that polyolefins are not broken down into their constituent monomers for recycling. The constituent monomers of, for example, polyethylene and polypropylene are ethylene and propylene respectively, both gases, the formation of which from polymer would be energy- and cost-prohibitive, thus eliminating the incentives for recycling, even if it would be possible to completely break down those polymers to their constituent monomers. As evidence to support their argument, Appellants direct the Board's attention to "Plastics Recycling: What makes sense?" from E.B. Nauman & Associates (www.ebnauman.com/recycle1.htm) (at 9.1, Evidence Appendix), which states:

Pyrolysis is a process for decomposing plastics, in the absence of air, into usable gases, oils, and coke... The economics are terrible as is the energy efficiency. Those readers familiar with the petrochemical industry will recognize that cracking natural gas liquid is easier than cracking naphtha, that cracking crude is not fully commercial and that cracking plastics is an abomination. Better they be burned! (E.B. Nauman, page 1 of 2; emphasis added).

Instead, polyolefins are generally recycled as polymer, and not broken down to their constituent monomers.

Plastics recycling can take two forms: the reclaimed plastics can be used for applications not typical of virgin plastics or they can replace virgin plastics. The first form has not been an economic success, although new, high-value applications may yet be found. The second form is the only valid one for an environmentalist. Recycled plastics must displace virgin polymers. To do this they must have properties that closely approach those of virgin polymers and have prices less than those of virgin polymers. This has proven a difficult but not

impossible goal. (E.B. Nauman, page 1, bridging to page 2; emphasis added).

E. B. Nauman continues by listing the required characteristics for recycling plastics:

- They should be free from point-to-point variations in molecular weight.
- The average molecular weight should be controllable. (Page 2).

Those skilled in the art are well aware that a polymer's molecular weight is proportional to its melt-viscosity. As evidence in support of this position, Appellants submit herewith (at 9.2, Evidence Appendix) a partial copy of "Packaging Materials: 3. Polypropylene as a Packaging Material for Foods and Beverages", Philip Tice, © 2002 International Life Sciences Institute, pp 5-6; <http://europe.ilsa.org/file/3-RPPM3Polyprop.pdf>), which discusses different grades of polypropylene and indicates:

Melt-viscosity, which correlates with the weight-average molecular weight of the polymer, is used to select the grade appropriate for the specific process. Standardised melt-flow rate (MFR) tests are normally used to provide the information. Polymer grades with low MFR values (high molecular weight) are used in sheet extrusion, for subsequent thermoforming processing and also for blow moulding. Films are manufactured from intermediate grades, and grades with the higher MFR values are used for injection moulding (citations omitted). (Page 6, bottom).

Additionally, melt flow index is indicated as being a "key characteristic when setting mould flow conditions" for recycled polypropylene (The Consortium for Automotive Recycling and The British Plastics Federation, Recycled Plastic Specification – Generic Family A: Polypropylene, Derek Williams, April 28, 2000; fourth page (indicated pagination from www incorrect); <http://www.caregroup.org.uk/ppspec.pdf>; copy attached at 9.3, Evidence Appendix).

Finally, further evidence of the distinction between different melt-flow rate polymers is provided at http://www.rco.on.ca/factsheet/fs_g03.html ("Recyclable Materials: Recycling Tubs & Lids – 1994"; The Recycling Council of Ontario; copy attached at 9.4, Evidence Appendix), which states:

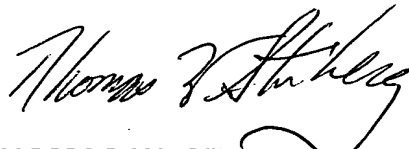
To ensure recycled resin quality when recycling plastic, it is crucial that resin types with different molecular structures or viscosities not be mixed. (Page 1, fifth paragraph, emphasis added).

Accordingly, it is clear that those skilled in the art of plastics recycling do not consider polypropylenes having differing melt-viscosities to be recyclable together, in contrast to the Examiner's arguments to the contrary.

As such, Appellants respectfully submit that the polypropylenes having different melt flow rates described in Ofosu et al., are not "the same, single polymer" for the purposes of the present claims, nor for the purpose of recycling, as proposed by the Examiner. Withdrawal of the rejection over Ofosu et al. in view of McAmish et al. is requested.

For the foregoing reasons, Appellants earnestly solicit withdrawal of the rejections and allowance of the claims.

Respectfully submitted,



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Dated: 8/18/05

TWS:fgl

Attachments:

- 8. Claims Appendix
- 9. Evidence Appendix (9.1-9.4)

8. CLAIMS APPENDIX

Claims 1-75 (cancelled).

76. A thermally bonded nonwoven fabric comprising multiple nonwoven layers which are made of hard yarn meltspun polyolefin fibers and which are constituted of the same, single polymer, and at least one nonwoven layer of fibers comprising polyolefin without a fluorocarbon additive having cross-sectional areas of less than about $75 \mu\text{m}^2$, and wherein at least one hard yarn meltspun nonwoven layer has a repellent fluorocarbon finish, said fabric having a basis weight between about 13-125 g/m^2 , a grab tensile strength in both the machine- and cross-directions at least about $1 \text{ N}/(\text{g/m}^2)$, normalized for basis weight, and a combination of Frazier permeability at least about 10 and up to about $30 \text{ m}^3/\text{min-m}^2$ and hydrostatic head between about 75 and 99 cm.

77. (Canceled).

78. (Canceled).

79. A thermally bonded nonwoven fabric comprising multiple nonwoven layers which are made of hard yarn meltspun polyolefin fibers and which are constituted of the same, single polymer, and at least one nonwoven layer of fibers comprising polyolefin without a fluorocarbon additive having cross-sectional areas of less than about $75 \mu\text{m}^2$, and wherein at least one hard yarn meltspun nonwoven layer has a repellent fluorocarbon finish, said fabric having a basis weight between about 13-125 g/m^2 , a grab tensile strength in both the machine- and cross-directions at least about $1 \text{ N}/(\text{g/m}^2)$, normalized for basis weight, and a combination of Frazier permeability at least about 15 and up to about $30 \text{ m}^3/\text{min-m}^2$ and hydrostatic head between about 75 and 99 cm.

80. (Canceled).

81. The thermally bonded nonwoven fabric of claim 76 or 79, wherein two nonwoven layers of hard yarn meltspun polyolefin spunbond fibers are bonded to opposite sides of a nonwoven layer of meltblown polyolefin fibers having cross-sectional areas of less than about $75 \mu\text{m}^2$.

82. (Canceled).

83. A garment comprising a thermally bonded nonwoven fabric having multiple nonwoven layers which are made of hard yarn meltspun polyolefin fibers and which are constituted of the same, single polymer, and at least one nonwoven layer of fibers comprising polyolefin without a fluorocarbon additive having cross-sectional areas of less than about $75 \mu\text{m}^2$, and wherein at least one hard yarn meltspun nonwoven layer has a repellent fluorocarbon finish, said fabric having a basis weight between about 13-125 g/m^2 , a grab tensile strength in both the machine- and cross-directions at least about 1 $\text{N}/(\text{g/m}^2)$, normalized for basis weight, and a combination of Frazier permeability at least about 10 and up to about 30 $\text{m}^3/\text{min-m}^2$ and hydrostatic head between about 75 and 99 cm.

84. (Canceled).

85. (Canceled).

86. A garment comprising a thermally bonded nonwoven fabric having multiple nonwoven layers which are made of hard yarn meltspun polyolefin fibers and which are constituted of the same, single polymer, and at least one nonwoven layer of fibers comprising polyolefin without a fluorocarbon additive having cross-sectional areas of less than about $75 \mu\text{m}^2$, and wherein at least one hard yarn meltspun nonwoven layer has a repellent fluorocarbon finish, said fabric having a basis weight between about 13-125 g/m^2 , a grab tensile strength in both the machine- and cross-directions at least about 1 $\text{N}/(\text{g/m}^2)$, normalized for basis weight, and a combination of Frazier permeability at least about 15 and up to about 30 $\text{m}^3/\text{min-m}^2$ and hydrostatic head between about 75 and 99 cm.

87. The garment of claim 83 or 86, wherein two nonwoven layers of hard yarn meltspun polyolefin spunbond fibers are bonded to opposite sides of a nonwoven layer of meltblown polyolefin fibers having cross-sectional areas of less than about $75 \mu\text{m}^2$.

88. (Canceled).

89. The thermally bonded nonwoven fabric of claim 76 or 79, which has a hydrostatic head between about 80 and 99 cm.

90. (Canceled).

91. The garment of claim 83 or 86, wherein said thermally bonded nonwoven fabric has a hydrostatic head between about 80 and 99 cm.

92. (Canceled).

93. The thermally bonded nonwoven fabric of claim 76 or 79, which has a cross sectional void percentage of at least about 85 percent.

94. The garment of claim 83 or 86, wherein the thermally bonded nonwoven fabric has a cross sectional void percentage of at least about 85 percent.

95. The thermally bonded nonwoven fabric of claim 76 or 79, wherein said at least one nonwoven polyolefin layer comprising fibers having cross-sectional areas of less than about $75 \mu\text{m}^2$ comprises fibers having cross-sectional areas in the range from about 6 to about $54 \mu\text{m}^2$.

96. The garment of claim 83 or 86, wherein said at least one nonwoven polyolefin layer comprising fibers having cross-sectional areas of less than about $75 \mu\text{m}^2$ comprises fibers having cross-sectional areas in the range from about 6 to about $54 \mu\text{m}^2$.

9. EVIDENCE APPENDIX

Attached hereto are copies of the following documents submitted with Appellants' response filed 18 May 2005, and indicated as having been considered by the Examiner in the Final Office Action, page 5.

9.1. "Plastics Recycling: What makes sense?" from E.B. Nauman & Associates.

9.2. "Packaging Materials: 3. Polypropylene as a Packaging Material for Foods and Beverages", Philip Tice, © 2002 International Life Sciences Institute, pp 5-6.

9.3. The Consortium for Automotive Recycling and The British Plastics Federation, Recycled Plastic Specification – Generic Family A: Polypropylene, Derek Williams, April 28, 2000; page 4.

9.4. "Recyclable Materials: Recycling Tubs & Lids – 1994"; The Recycling Council of Ontario.

9.1

(Emphasis added)

E. B. Nauman & Associates[Home](#)[Services](#)[Clients](#)[Associates](#)[Contact Us](#)[ChemExpert.com](#)**PLASTICS RECYCLING: WHAT MAKES SENSE?**

Plastics are a highly visible component of trash. They constitute only 12% by weight and, until they settle and compact, perhaps 20% by volume; but people recognize plastics and blame them for a disproportionate share of our waste disposal problems.

The following methods have been proposed for dealing with plastics in household waste stream:

- Ban plastics outright.
- Bury them in landfills.
- Burn them in municipal incinerators.
- Pyrolyze them to industrial chemicals.
- Recycle them to useful products.

The first option is absurd but remains the avowed policy of some fringe environmental groups. Their strategy was to first ban chlorine, then plastics and solvents, as stated by Joe Thornton of Greenpeace as cited in *Science* magazine [261, 152-154 (1993)]. Responsible environmentalists, consumers and plastics producers may choose to dismiss these extremists, but should accept the burden of disposing of used plastics in an environmentally sound fashion.

Landfilling is out of fashion, but the shortage of landfill space is more a perception than reality in most countries. The raw materials for plastics came from the ground and can be returned to the ground without grave environmental consequences. Plastics are essentially inert. In landfills, they behave much like sand. They cause no leachate problems and remain available for future mining operations if the price of oil should rise dramatically. Other than actual recycling, landfilling is, in our judgment, the best option for plastics disposal.

Incineration is the favored disposal option in Japan and much of Europe. The United States fears air pollution. Even completely clean combustion will produce carbon dioxide which is the primary greenhouse-effect gas. Burning will reclaim some energy, but far less than the energy used in manufacturing the plastics. To make one kilogram of plastics, it takes the energy equivalent of three to four kilograms of crude oil pumped from the ground. It seems a shame to burn plastics if their inherent energy content can somehow be recaptured.

Pyrolysis is a process for decomposing plastics, in the absence of air, into usable gases, oils, and coke. It has been a favored option of the large plastics companies in the United States

and coke. It has been a favored option of the large plastics companies in the United States. They favored it because it is different from the politically incorrect options of landfilling and incineration yet does not generate products that will compete with virgin polymers. The economics are terrible as is the energy efficiency. Those readers familiar with the petrochemical industry will recognize that cracking natural gas liquid is easier than cracking naphtha, that cracking crude is not fully commercial and that cracking plastics is an abomination. Better they be burned!

Plastics recycling can take two forms: the reclaimed plastics can be used for applications not typical of virgin plastics or they can replace virgin plastics. The first form has not been an economic success, although new, high-value applications may yet be found. The second form is the only valid one for an environmentalist. Recycled plastics must displace virgin polymers. To do this they must have properties which closely approach those of virgin polymers and have prices less than those of virgin polymers. This has proven a difficult but not impossible goal.

The required characteristics for a recycled plastic are the following:

- The individual plastics should be sorted according to type, e.g., polystyrene, low density polyethylene, high density polyethylene, polypropylene, polyvinyl chloride and polyethylene terephthalate.
- They should be free from dirt.
- They should be free from point-to-point variations in molecular weight.
- The average molecular weight should be controllable.
- The polymer should be free from pigments and dyes.
- To the extent that the above desiderata are not achieved, the cost, relative to virgin, must be low enough to compensate.

The first point, sorting, is vital and has received most emphasis. Hand sorting remains the rule, since the economics of machine sorting are poor. Hand sorting uses subsidized or disadvantaged labor in the first world countries. It is common in third world countries where most household trash is gleaned by the poor. Developing countries, such as Korea, seem to have been spared the indignity of sorting trash.

Hand or machine sorting cannot eliminate dirt or point-to-point variations and thus gives products of low quality compared to the virgin plastics. A new technique, selective dissolution, developed at Rensselaer Polytechnic Institute, achieves good sorting, removes dirt and produces a homogeneous product. It does so at a cost projected to be less than half that of the virgin polymers. Possible process improvements include depigmentation and control of average molecular weight. Thus the goal of near virgin properties at less than virgin prices seems achievable. The environmentalist will have the satisfaction of knowing that each kilogram of recycled plastic saves several kilograms of crude oil. The economist will know that recycling saves foreign exchange. The consumer will have the same convenient packaging at the same cost. Some plastics producers will lose market share. Others will benefit.

9.2

ILSI Europe
Report Series

PACKAGING MATERIALS:
3. POLYPROPYLENE
AS A PACKAGING MATERIAL
FOR FOODS AND BEVERAGES



REPORT

Prepared under the responsibility of the
ILSI Europe Packaging Material Task Force

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ILSI Europe Report on Packaging Materials: 3. Polypropylene as a Packaging Material for Foods and Beverages

ILSI Europe Packaging Material Task Force, 83 Avenue E. Mounier, Box 6, B-1200, Brussels, Belgium.



**PACKAGING MATERIALS:
3. POLYPROPYLENE AS A PACKAGING
MATERIAL FOR FOODS AND BEVERAGES**

by Philip Tice

REPORT

PREPARED UNDER THE RESPONSIBILITY OF THE ILSI EUROPE PACKAGING MATERIAL TASK FORCE

July 2002

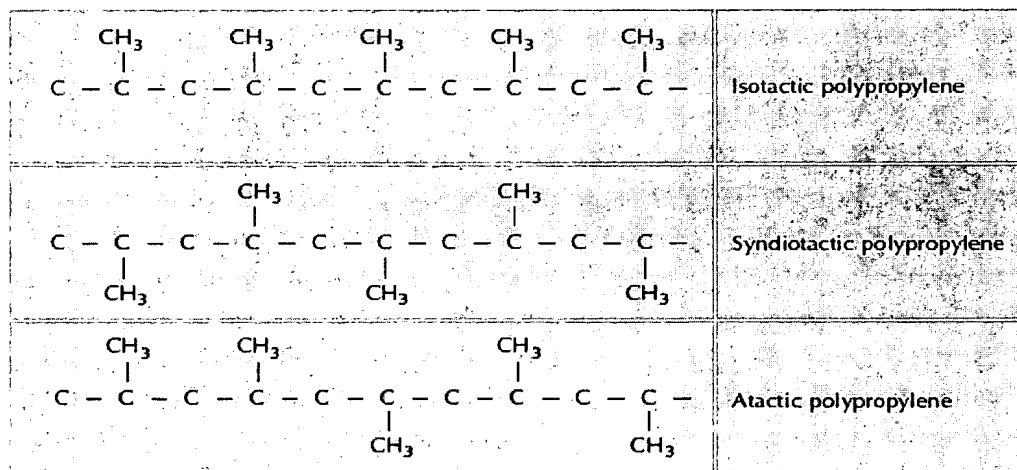
WHAT IS POLYPROPYLENE?

Polypropylene (PP) is a member of the polyolefin class of polymers. These polymers are derived from olefin monomers (unsaturated hydrocarbons); ethylene is the monomer for polyethylene. Polypropylene plastics began to find commercial applications in the 1950s. Thermoplastics based on polypropylene are now second in commercial importance only to those based on polyethylenes. World production of polypropylene reached 30 million tonnes in 2000 and is likely to increase with new production capacity (Robinson, 2001).

Unlike polyethylene, polypropylene has three basic polymeric forms: isotactic, syndiotactic and atactic. These different polymeric forms arise because, compared to the starting substance for polyethylene $\text{CH}_2=\text{CH}_2$ (ethene), the starting substance propylene $\text{CH}_3\cdot\text{CH}=\text{CH}_2$ (propene), has a methyl (CH_3) group in place of a hydrogen. In the isotactic form of polypropylene the methyl group has the same configuration at each tertiary carbon atom along the polymer chain. In the syndiotactic form, the methyl group alters position on alternative tertiary carbon atoms. In the atactic form, the methyl group takes up random positions on the tertiary carbon atoms.

Schematic illustrations of the three polymer forms are given in Figure 1. The polymer chains are actually helical and with the isotactic form the methyl groups all point outwards.

Figure 1. Schematic illustrations of the three polymeric forms of polypropylene



Commercial propylene homo-polymers are primarily isotactic with $\leq 5\%$ of the atactic form and are high-molecular-weight semi-crystalline solids. Impact strength (toughness) is moderate, but tensile strength and stiffness are excellent. It is the semi-crystalline nature as well as the other properties that make the isotactic form the most suitable as a commercial plastic for food packaging and other applications.

Improvements in impact strength of isotactic polypropylene are obtained by co-polymerising with ethylene and/or 1-butene (typically 1%–7%), which produces random co-polymers. These co-polymers are relatively transparent but have lowered melting points, with reduced stiffness and tensile strengths. Commercial propylene homo-polymer can become rather brittle at sub-zero temperatures. The propylene-ethylene co-polymers are less brittle at low temperatures.

Blending of commercial propylene homo-polymer with propylene-ethylene co-polymers also is used to modify and improve the physical properties of tensile strength and toughness.

Syndiotactic propylene polymers are less crystalline. They have found only limited use, mainly as elastomers.

The atactic form of polypropylene, which is amorphous and tacky, is used as a hot-melt adhesive but has few other applications.

Other properties of commercial propylene homo-polymer include low water vapour transmissions, medium gas permeability, good resistance to solvents, good resistance to grease/oils and chemicals, good abrasion resistance, good gloss and high clarity in oriented (stretched) film form. In recent years clarity of polypropylene plastics in non-oriented (unstretched) thicker forms, such as those used for pots and containers, has been improved with developments in manufacturing processes.

Propylene homo-polymers and the co-polymers are prone to oxidative degradation, particularly at the elevated temperatures used for processing. The formulations of all commercial polypropylene plastics therefore, contain effective antioxidants (*see Basic Chemistry section*). Oxidation causes polypropylene to break down to lower-molecular-weight products.

Plastics formulated from propylene homo-polymer and the co-polymers can be processed by all the common plastic manufacturing processes: blow moulding, injection moulding, thermoforming and film formation, both cast and oriented. Co-polymers with ethylene are usually preferred for injection moulding and blow moulding. Melt-viscosity, which correlates with the weight-average molecular weight of the polymer, is used to select the grade appropriate for the specific process. Standardised melt-flow rate (MFR) tests are normally used to provide the information. Polymer grades with low MFR values (high molecular weight) are used in sheet extrusion, for subsequent thermoforming processing and also for blow moulding. Films are manufactured from intermediate grades, and grades with the higher MFR values are used for injection moulding (Brady and Marsh, 1997; Parker, 1997; Robertson, 1992).

9.3
(next five pages)



The Consortium for Automotive Recycling and The British Plastics Federation

Recycled Plastic Specification - Generic Family A : Polypropylene

Reference: CARE/BPF/PP001

Scope:

This specification is intended to provide base requirements for plastics, containing post-consumer derived recyclate, which has the potential to be used in automotive or similar quality oriented engineering applications. It is indicative of the performance and quality demanded within the automotive sector which, in turn, reflects the environmental extremes encountered by materials used in vehicles constructed for use in a global market.

Material Description:

Polypropylene (PP) containing 40% talc (mineral) filler. The polymer content should contain a minimum of 25% post consumer sourced recyclate.

Typical applications:

- Air cleaner housings.
- Lighting units.
- Air conditioning unit housings

The applications are primarily underbonnet locations which require stability of the material at elevated temperatures.

Colour and Appearance:

The material supplied should be in a pellet form and be black in colour. It should be free from any objectionable odour and free of any excessive visible inclusions.

Material Performance / Properties:

The following criteria should be regarded as a minimum set of data to be submitted to the 'customer' as an initial qualification prior to any final approval process. Tests should be conducted on standard moulded test pieces (where applicable) that have been conditioned prior determining the particular parameter.

Compiled by: Derek Wilkins, CARE Group UK (Email : derek.wilkins@rovergroup.com)

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Material Properties:

Typical Property	Method	Units	Value °	Range
Melt Flow Index @ 230 C.	ISO 1133	g/10min	15	12 - 18
Ash content @ 550 C for 30 min	ISO 3451/1. Method A	%	37	37 - 40
Specific Gravity	ISO 1183/A	g/cm3	1.25	1.2 - 1.25
Flexural Modulus @ 23 C	ISO 178	MPa	4300	3500 (min)
Flexural Modulus @ 140 C	ISO 178	MPa	300	250 (min)
Flexural Yield Strength @ 23 C	ISO 178	MPa	47	40 - 50
Flexural Yield Strength @ 140 C	ISO 178	MPa	6	5 - 10
Tensile Strength @ yield @ 23 C	ISO 178	MPa	28	22 - 25
Tensile Strength @ Yield @ 120 C	ASTM D638	MPa	7.5	
Tensile Strength @ Yield @ 140 C	ASTM D638	MPa	3.3	
Tensile Strength at Maximum Load	ISO R527	MPa		24 (min)
Elongation @ Yield @ 23 C	ISO R527	%	8	5- 10
Elongation @ Yield @ 140 C	ASTM D638	%	8	
Elongation @ Break @ 23 C	ISO R527	%	8	8 (min)
Elongation @ Break @ 140 C	ASTM D368	%	>150	
Notched Izod Impact Strength @ 23 C	ISO R180/A	KJ/m2	2.3	2 (min)
Notched Izod Impact Strength @ 10 C	ISO R180/A	KJ/m2	2.1	1.6(min)
Notched Izod Impact Strength @ -20 C	ISO R180/A	KJ/m2	2	1.5 (min)
Notched Izod Impact Strength @ -40 C	ISO R180/A	KJ/m2	2	1.4 (min)
Heat Distortion Temperature	ISO 75/ 0.47MPa	C	137	118 (min)
Heat Distortion Temperature	ISO 75/ 1.81MPa	C	80	67 (min)
Coefficient of linear thermal expansion	ASTM D696	per 1C	5.6 x 10-5	
Flammability	ISO 3795	mm/min	81	100(max)
Mould Shrinkage (48hrs @ 23 C)	ISO 2577	%	1	0.5 - 0.9
Mould Shrinkage (48hrs @ 80 C)	ISO 2577	%	0.21	0 - 0.15
Mould Shrinkage (30 mins @ 120 C)	ISO 2577	%	0.46	0.1 - 0.3
Hardness, Durometer D	ISO 868	No	71	68 (min)

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Fog number (passenger compartment applications)	SAE J1756	No	50	90 (min)
Properties after heat ageing at:				
500 hours at 140°C (engine bay use)				
Tensile strength change	ISO R527	%	5	+/- 15
Impact strength, Izod change	ISOR180/A	%	5	+/- 15
500 hours at 120°C (non engine bay use)				
Tensile strength change	ISO R527	%	5	+/- 15
Impact strength, Izod change	ISOR180/A	%	5	+/- 15

Restricted contaminants		Value^o	Range
Antimony	Sb	2 ppm	<5 ppm
Arsenic	As	4 ppm	<5 ppm
Chromium	Cr	3 ppm	<25 ppm
Cadmium	Cd	14 ppm	<100 ppm
Lead	Pb	15 ppm	<100 ppm
Mercury	Hg	<1 ppm	<1 ppm
Halogens (combined value)	Cl, Br, F, I	20 ppm	<50 ppm

Thermal Analysis:

In addition to the above data a Shear Modulus Vs Temperature curve shall be obtained (using a Dynamic Mechanical Analysis Technique) between -50 C and +160 C. Subsequent batches should not deviate by more than +/- 10% of the original curve. The curves being generated on similar equipment using a standard heating rate (and the appropriate DIN Specification. *Ref to be included*)

Infra Red Analysis:

Each batch of material should be accompanied by a 'fingerprint' trace derived from an infra red spectrophotometry scan. No significant deviations from the original curve should be observed.

Health and Safety:

All grades of material should be accompanied by the necessary Health and Safety Handling Data Sheet and Environmental Impact Assessment.

Compiled by: Derek Wilkins, CARE Group UK (EMail : derek.wilkins@rovergroup.com)

** Indicative values. Refer to customer for specific limits and / or the legislative requirements applicable at that time.*

Storage and Handling:

Non-toxic, chemically inert material.

Store in a dry, ventilated area away from direct sunlight exposure.

This product is insoluble in all common solvents at room temperature.

Drying of the granules (80°C to 90°C for 3 to 4 hours) before moulding is recommended.

Typical processing conditions:

Melt temperature range 200°C - 250°C

Mould temperature range 30°C - 50°C

Back pressure Low *Adjust pressure and times to fill and pack properly.*

Screw speed Low - Medium

Fill speed Low - Medium

Explanatory notes on the test parameters requested:

Melt Flow Index:

An inverse measure of molecular weight. i.e. an increase in molecular weight results in a decrease in melt flow index. Indicative of degradation. Key characteristic when setting mould flow conditions.

Ash content:

Needs to be kept within close tolerance limits. Effects stiffness (modulus) and vibration characteristics.

Specific Gravity:

Important parameter for weight calculations.

*Temperature ranges:

Strength and stiffness measurements are determined at typically two temperature extremes e.g. 23°C and 140°C. This is to assess the performance of the material in, for example, an engine bay application where temperatures up to 140°C can be experienced.

Flexural modulus*:

Is a key measure of stiffness. Components made from this material must remain rigid and dimensionally stable. The measure will also give some indication as to the materials' vibration / damping characteristics, which is significant when considering the resonant effects of an air filter for example.

Tensile strength*:

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Used to quantify the mechanical strength, and in combination with the elongation data, the toughness of a material.

Other tensile properties including elongation at yield and at break:

These parameters are usually determined within the same test protocol as the tensile strength. When the results are combined they give an overall assessment that the material is strong enough and tough enough to do the job required.

Notched Izod Impact Strength:

Most commonly employed method used to determine resistance of plastic materials to withstand impact. Conducted at a range of temperatures between ambient and -40°C to reflect the most vulnerable circumstances to which a component can be exposed i.e. cold climate.

Heat Distortion Temperature:

Used to determine if the material will distort under load at elevated temperature. It can also indicate the presence of significant levels of polyethylene (contamination) by lowering the HDT and having an increase in impact performance. The material must not distort excessively under load.

Coefficient of linear thermal expansion:

Components often fit in close proximity to or in direct contact with other components. Excessive expansion / contraction under extreme environmental conditions can give rise to squeaks, rattles and distortion (load) effects.

Flammability:

Legislative requirement to minimise fire risk potential.

Mould shrinkage:

Although dependent on the actual component design and moulding conditions, Mould shrinkage variations have often been cited as a problem with recycled material. Determination of this parameter will go some way to achieving a satisfactory confidence level.

Hardness:

More applicable to interior 'visual' components but a simple test worth quoting.

Fog number:

A test that will determine volatile material within the compound. A low volatility is required to ensure no potential Health and Safety issues arise from volatile species. The test originated in determining the potential to fog (re-condense) on the interior of a vehicle windscreen.

Heat ageing:

Ensures that the potential for degradation of the polymer in service is minimal. The compound should be stable and not undergo any structural change during the life of the vehicle.

9.4

(Emphasis added)



Recyclable Materials



RECYCLING TUBS & LIDS - 1994

Background

When the Recycling industry refers to tub & lids, they are referring to margarine, ice cream or other dairy containers and their lids (not including milk jugs) . These "tub" containers are made of either Polypropylene (PP) or High Density Polyethylene (HDPE). Lids are made of Low Density Polyethylene.

In Ontario, very few municipalities representing about 398,000 households, collect these containers for recycling. In 1993, 253 tonnes were given to markets. The end markets are companies that manufacture plastic lumber. Most municipalities have decided against the addition of these materials in their program because, with \$0 revenue, it is far too costly.

Polymers Differences

Tubs & lids require "injection moulding" in the manufacturing process of the container. Injection moulding needs a polymer with a low molecular weight. Low molecular weight resins have a low viscosity. "Viscosity" refers to the property of "staying together" when heat is applied. Low viscosity resins for injection moulding turn into a water like substance with the application of heat.

Bottles are "blow moulded". Blow moulding is when molten plastic (high viscosity, forming a "mud like" substance) is forced under pressure through a nozzle to form a tube, and then blown with air to form a bottle. (a similar process to blowing glass.)

Recycling Tubs & Lids

To ensure recycled resin quality when recycling plastic, it is crucial that resin types with different molecular structures or viscosities not be mixed. For example HDPE bottles & HDPE tubs cannot be mixed. Similarly, LDPE lids & LDPE film cannot be mixed. Therefore materials must be separated by viscosity.

Markets for Mixed Tubs & Lids

Research is being done to find new markets for mixed tubs & lids. Presently the only market for these mixed resins are companies that make artificial lumber. By adding 25% of this mixed resin to virgin HDPE, the plastic formed, can be applied to the manufacturing of creates, pallets or there similar products. A task force made up primarily of the plastics industry is presently identifying the potential applications for this mixed resin. Presently, milk crates, and three types of pallets are being tested by industry. Also, University of Toronto is researching the application of tubs & lids in "Polythalt" (plastic in asphalt as a patching material). "Polythalt" requires a low molecular weight, and unlike regular asphalt prevents coal cracking and rutting.

Markets for Separated Tubs & Lids

There is a market for separated tubs & lids. These separated resins could sell for about \$150.00/tonne if the buyer can rely on good quality & large quantities.

In Ontario most plastic sorting is done manually and therefore very expensive. To sort three new plastic types (HDPE & PP tubs & LDPE lids) that are difficult to optically identify, when quantities recovered are small, is economically inefficient.

As well, the end-user requires a steady large supply of the material in order to pay a good price for the material. For example, Resource Plastics in Brampton, requires at least 1 tonne/hour of a resin type to ensure economic sustainability. The secondary tub & lid supply from Ontario residents, cannot satisfy the demand from the end-markets.

Developments in B.C.

Tubs & Lids

Similar to Ontario, EPIC has funded a local pilot project aimed at demonstrating the feasibility of recycling mixed PP & HDPE tubs for the application of milk crates for the dairy industry. According to the ministry, the first tests were not conclusive, and a second study is presently being done.

HDPE Colour Resin

The B.C. ministry has made it clear that a move to "colour out" for detergent bottles would improve economics. Recently, however, the market price for coloured HDPE bottles has increased to \$150.00/tonne, resulting in a slow down in the "colour out" discussions.

Contacts for information on market development for Tubs & Lids

Fred Edgecomb. (416) 449-3444 Environmental & Plastics Institute of Canada (EPIC)

Jim Horn (519) 574-1574 Resource Plastics

Renie D'Aquila (604) 683-6009 Recycling Council of B.C. (RCBC)

Dave Brown (604) 387-9986 Ministry of the Environment for B.C.,
Municipal Solid Waste Division

The Recycling Council of Ontario's e-mail address is: rco@rco.on.ca.



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